

DEPARTMENT OF THE ARMY
Omaha District, Corps of Engineers
6014 U. S. Post Office and Court House
Omaha, Nebraska 68102

MROOP-H

20 July 1976

Memorandum
No. 1130-2-4

PROJECT OPERATION**Service Rates for Generating Equipment
at Hydroelectric Power Plants****RCS: DAEN-CWO-34 (Feeder)**

1. **Purpose.** This memorandum establishes reporting procedures, provides a systematic method for recording, processing and reporting the availability, failure and usage rates of generating equipment at hydroelectric power plants.
2. **Applicability.** This memorandum is applicable to all Omaha District Hydroelectric Power Plants except Big Bend Power Plant. (Service rates at Big Bend are calculated automatically by installed computer equipment.)
3. **Reference.** ER 1130-2-338.
4. **Definitions.**
 - a. **Period Hours (PH).** The number of hours in year for existing units. For new units, the hours since the unit was first synchronized until the end of the year.
 - b. **Service Hours (SH).** The hours that a generating unit is connected to the transmission system either supplying power or condensing; i.e., the time during which the generator main power circuit breaker is closed.
 - c. **Reserve Standby Hours (RSH).** The hours that a generating unit is not in service but available for use if required.
 - d. **Available Hours (AH).** The hours that a unit is available. AH is equal to the sum of SH plus RSH.
 - e. **Forced Outage Hours (FOH).** The hours for any failure, misoperation or malfunction that results in the immediate automatic or manual removal of a generating unit from connection to the transmission system or that prevents such connection from being accomplished when desired.
 - f. **Delayed Forced Outage Hours (DFOH).** The hours for any malfunction that results in removal of a generating unit from connection to the transmission system for maintenance or repair at a later time so as to allow an outage to be scheduled after the trouble developed.

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g. **Scheduled Outage Hours (SOH).** The hours for a routine out-of-service condition for periodic maintenance and repair that has been planned into a power schedule.

h. **Planned Modification Hours (PMH).** Scheduled outage for installation of new equipment, switchyard rearrangements or to correct design or construction deficiencies. Replacement of existing equipment due to failure or normal deterioration is not included. (See Note 1 below.)

i. **Generator Forced Outage (GFO).** Any generating unit forced outage caused by a misoperation, failure or malfunction of a turbine, water passage, governor, or generator, including related auxiliaries or controls. These items are considered to represent a generating unit.

j. **Non-Generator Forced Outage (NGFO).** A forced outage caused by misoperation, failure or malfunction of equipment or facilities beyond the load side of the generator terminals.

k. **Non-Generator Scheduled Outage (NGSO).** A scheduled outage for equipment other than a generating unit. (3j above and Note 1 below.)

NOTE 1: When a variety of work is performed on both generating unit and non-generating equipment, the primary reason for the outage will determine to which category the outage hours will be charged.

NOTE 2: Outages due to reservoir conditions, high tailwaters, flood control operations, loss of transmission lines or short outages for trash dumping are not to be considered unavailable time.

5. Records. Each hydroelectric power plant shall complete MRO Form 1466, Power Plant Operating Statistics, for each generating unit. The month (1 to 12), day (1 to 31), hour (0 to 23) and minute (0 to 59) shall be entered on the form for the beginning and ending of each category defined above. The reason for all forced outages should be noted in the remarks column. A completed form(s) for each generating unit shall be submitted to Operations Division, Attention: MROOP-H, by 10 January covering the preceding year's operation. The reports for each unit shall be consecutively numbered for each year's operation. Form 1466 will be used to compute the service rates and defined category hours for each power plant and the composite rates for the district.

6. Reports. Operations Division will review the completed MRO Forms 1466 and send them to the Automatic Data Processing Center for computer processing. Automatic Data Processing Center will furnish a computer printout containing the following information for each power plant and the composite for the district:

- a. Operating Rate = $\frac{SH}{PH} \times 100$
- b. Standby Rate = $\frac{RSH}{PH} \times 100$
- c. Availability Rate = $\frac{SH + RSH}{PH} \times 100$
- d. Generator Forced Outage Rate = $\frac{GFO}{SH + FOH} \times 100$
- e. Non-Generator Forced Outage Rate = $\frac{NGFOH}{SH + FOH} \times 100$
- f. Generator Delayed Forced Outage Rate = $\frac{GDFO}{PH} \times 100$
- g. Non-Generator Delayed Forced Outage Rate = $\frac{NGDFO}{PH} \times 100$
- h. Generator Scheduled Outage Rate = $\frac{GSO}{PH} \times 100$
- i. Non-Generator Scheduled Outage Rate = $\frac{NGSO}{PH} \times 100$
- j. Planned Modification Outage Rate = $\frac{PMH}{PH} \times 100$
- k. Total main generators at end of year.
- l. Total possible main unit hours. This will be the PH multiplied by the units.
- m. The total in-service hours (SH).
- n. The total standby hours (RSH).
- o. The total available hours (AH).
- p. The total number of generator forced outages.
- q. The total out-of-service hours for generator forced outages.
- r. The total number of non-generator forced outages.
- s. The total out-of-service hours for non-generator forced outages.
- t. The total out-of-service hours for generator delayed forced outages.
- u. The total out-of-service hours for non-generator delayed forced outages.
- v. The total out-of-service hours for generator scheduled outages.
- w. The total out-of-service hours for non-generator scheduled outages.
- x. The total out-of-service hours for planned modification outages.

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Operations Division will complete ENG Form 4338-R, Generating Equipment Service Summary, and submit three copies to Missouri River Division, Attention: MRDOP, by 1 February annually. A copy of ENG Form 4338-R will be furnished to each hydroelectric power plant.

FOR THE DISTRICT ENGINEER:

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DISTRIBUTION:

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